CLAIMS

1. An engine control system comprising:

an ion current measuring unit that measures the negative ion current in a combustion chamber of an engine;

a crank-angle measuring unit that measures an engine crank angle; and

a controller that controls the engine on the basis of a first crank angle at which the increase rate of the negative ion current against the crank angle becomes more than a first specified value and a second crank angle at which the increase rate becomes a second specified value after becoming the first specified value.

2. The engine control system according to Claim 1, wherein

the first crank angle is a crank angle corresponding to the rising point of the negative ion current on a negative ion current curve indicative of variations in negative ion current against crank angles; and

the second crank angle is a crank angle corresponding to the peak point of the negative ion current on the negative ion current curve.

3. The engine control system according to Claim 2, wherein the controller calculates a third crank angle corresponding to the fuel center of gravity from the first crank angle and the second crank angle, and controls engine ignition

timing so that the third crank angle reaches a specified target crank angle.

4. The engine control system according to Claim 3, wherein the target crank angle is set so as not to be changed according to engine load conditions.

5. The engine control system according to Claim 3, wherein the crank angle is set to a specified crank angle corresponding to MBT.

6. The engine control system according to Claim 3, wherein the target crank angle is set to a specified crank angle delayed behind MBT.

7. The engine control system according to Claim 2, wherein the controller calculates the variation rate of the third crank angle corresponding to the fuel center of gravity from the first crank angle and the second crank angle, and controls the exhaust gas recirculation (EGR) rate of the engine so that the engine EGR rate decreases with increasing variation rate.

8. The engine control system according to Claim 2, wherein the controller calculates the variation rate of the third crank angle corresponding to the fuel center of gravity from the first crank angle and the second crank angle, and controls the open-close timing of an intake valve and an exhaust valve of the engine so that the overlap period of the intake valve and the exhaust valve decreases with increasing variation

rate.

9. A vehicle comprising an engine and the engine control system according to one of Claims 1 to 8.

10. A method for calculating the fuel center of gravity of an engine, the method comprising the steps of:

measuring the negative ion current in a combustion chamber of the engine;

determining a first crank angle at which the increase rate of the negative ion current against the engine crank angle becomes more than a first specified value;

determining a second crank angle at which the increase rate becomes a second specified angle after becoming the first specified angle; and

calculating the fuel center of gravity from the first crank angle and the second crank angle.

11. A method for controlling the operation of an engine, the method comprising the steps of:

measuring the negative ion current in a combustion chamber of the engine;

determining a first crank angle at which the increase rate of the negative ion current against an engine crank angle becomes more than a first specified value;

determining a second crank angle at which the increase rate becomes a second specified angle after becoming the first specified angle; and

controlling the engine on the basis of the first crank angle and the second crank angle.

12. The method for controlling the operation of an engine according to Claim 11, wherein

the step of controlling the engine comprises the steps of:

calculating a third crank angle corresponding to the fuel center of gravity from the first crank angle and the second crank angle; and

controlling engine ignition timing so that the third crank angle becomes a specified target crank angle.